

REMARKS/ARGUMENTS

Reconsideration and withdrawal of the rejections of the application and consideration and entry of this paper are respectfully requested in view of the herein remarks, which place the application in condition for allowance.

I. STATUS OF THE CLAIMS AND FORMAL MATTERS

Claims 1-51 are currently pending and are rejected in the Office Action mailed on August 11, 2009. Claims 52-94 are new. No new matter has been introduced. Support for this amendment is provided throughout the Specification as originally filed.

II. RECORD OF TELEPHONE INTERVIEW

Initially, Applicants thank Examiner A. Momper and Supervisory Examiner R. Siconolfi for granting an after-final telephonic interview on January 7, 2010 with Applicants' representatives.

In the interview, Applicants' representatives presented a proposed response to the outstanding Office Action including amended claims and additional claims. Further, arguments were presented illustrating the features distinguishing the claimed belt over the cited references.

While no agreement was reached, the Examiner and her supervisor agreed that a belt adapted for use "immersed in oil" was apparently not disclosed in the references of record. Further, the Examiners agreed that use of a belt "in substantially continuous contact" with oil would likely distinguish over the references.

III. REJECTIONS UNDER 35 U.S.C. § 103

On page 3 of the Office Action, claims 1, 2, 4-10, and 51 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2002/0098935 to Danhauer et al. ("Danhauer") in view of U.S. Patent No. 4,498,891 to Mashimo et al. ("Mashimo").

Claims 11 and 12 are rejected under § 103(a) as allegedly being unpatentable over Danhauer in view of Mashimo and further in view of U.S. Patent No. 6,945,891 to Knutson ("Knutson").

Claims 13 and 14 are rejected under § 103(a) as allegedly being unpatentable over Danhauer in view of Mashimo and Knutson, and further in view of U.S. Patent No. 7,396,884 to Achten ("Achten").

Claims 15-22 are rejected under § 103(a) as allegedly being unpatentable over Danhauer in view of Mashimo and further in view of U.S. Patent No. 7,056,249 to Osako et al. ("Osako").

Claim 23 is rejected under § 103(a) as allegedly being unpatentable over Danhauer in view of Mashimo and Osaka in further view of Knutson.

Claim 24 is rejected under § 103(a) as allegedly being unpatentable over Danhauer in view of Mashimo and further in view of U.S. Patent No. 5,306,891 to Nakajima et al. ("Nakajima").

Claims 1-3, 25-27, and 43 are rejected under § 103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2004/0033857 to Welk et al. ("Welk") in view of Mashimo.

Claims 11, 12, 35, and 36 are rejected under § 103(a) as allegedly being unpatentable over Welk in view of Mashimo and Knutson.

Claims 13, 14, 37, and 38 are rejected under § 103(a) as allegedly being unpatentable over Welk in view of Mashimo and Knutson, and further in view of Achten.

Claims 15-21, 39-42, 44, 45 and 50 are rejected under § 103(a) as allegedly being unpatentable over Welk in view of Mashimo and Osako.

Claims 22 and 23 are rejected under § 103(a) as allegedly being unpatentable over Welk in view of Mashimo and Osako, in further view of Knutson.

Claims 24 and 48 are rejected under § 103(a) as allegedly being unpatentable over Welk in view of Mashimo and Nakajima.

Claims 28-34 are rejected under § 103(a) as allegedly being unpatentable over Welk in view of Mashimo and Danhauer.

Claims 46 and 47 are rejected under § 103(a) as allegedly being unpatentable over Welk in view of Mashimo and Knutson.

Claims 49 is rejected under § 103(a) as allegedly being unpatentable over Welk in view of Mashimo and Nakajima, in further view of U.S. Patent Application Publication No. 2004/0127316 to Hashimoto et al. ("Hashimoto").

Applicants respectfully traverse and request reconsideration and withdrawal of the rejections for at least the following reasons.

Independent claim 1 recites, *inter alia*:

Toothed belt for use with oil, the belt comprising:
a body...and
a plurality of resistant inserts;
wherein **said resistant inserts comprise fibers produced from at least a first and a second material**
wherein said toothed belt is adapted to operate in substantially continuous contact with oil or partially immersed in oil.

Independent claim 25 recites, *inter alia*:

Timing control...comprising...**a toothed belt adapted for use in substantially continuous contact with oil or partly immersed in oil**, and means for maintaining said toothed belt in oil-wet condition; said toothed belt comprising a body...and a plurality of resistant inserts, wherein said **resistant inserts comprise fibers produced from at least a first and a second material**.

Independent claim 51 recites, *inter alia*:

A toothed belt adapted for use in substantially continuous contact with oil or partly immersed in oil, the belt comprising a body...and a plurality of resistant inserts; wherein said **resistant inserts are produced from at least a first and a second material** and in that said **first material is glass fiber and said second material is carbon fiber**.

Emphasis added. Applicants respectfully urge that Danhauer and Mashimo, alone or in combination, fail to disclose or render predictable the above recited features, and that none of the above-cited art of record cures these deficiencies.

Each of the independent claims recites **a toothed belt**, and specifically **a toothed belt adapted for use in substantially continuous contact with oil or partly immersed in oil**, or variations thereof. Applicants respectfully submit that previously known toothed belts, including those cited as prior art references, are “dry toothed belts” and should not be mistaken for the oil-wet belt of the claims. That is, the prior belts were suitable for use in dry conditions, i.e., not **for use in substantially continuous contact with oil or partly immersed in oil** as claimed. Such belts were never intended to operate in oil-wet environments, nor was such use contemplated. Prior belts used in the automotive industry were all “dry toothed belts,” not lubricated belts. The claimed belt, contrary to previously known systems, is a toothed belt provided for use in an oil-wet condition, in **substantially continuous contact with oil or partly immersed in oil**, for example subject to oil spraying.

Accordingly, the claimed belt is suitable for operation in conditions comparable to internal combustion engine timing systems, including chain or gear transmissions, which require continuous lubrication, i.e., operate in an oil-wet condition. Previously known belts in automotive applications were outside the engine and were not subjected to continuous contact with oil or partly immersed in oil.

Oil-wet environments make use of chains and gears for power transmission. Replacement of chains and gears in existing systems in which the overall dimensions were thus already defined by such chains and gears. The chains and gears in oil-wet environments are of larger dimensions than belts used in “dry” environments, and were normally wider than similarly used chains. As explained above, this is because belts for dry conditions were never designed for use in oil-wet environments, nor was such use contemplated. Hence such systems, to make use of a toothed belt, require a toothed belt of comparable size to the existing chain system. Applicants thus identified and addressed the technical problem of providing a toothed belt, with improved mechanical properties throughout the life of the belt, for use in oil wet conditions, as well as the fact that such a belt needed to be narrower than previously known toothed belts.

Applicants discovered the claimed belt, including a resistant insert, or cord, comprised of two different materials, overcame the deficiencies of prior belts operating in oil wet conditions. In particular, the use of resistant inserts in a toothed belt for use in oil makes it possible to produce narrower belts which are able to function in substantially continuous contact with oil and therefore can be used to replace chains and gears in existing systems without varying the dimensions of the system. *See* page 15, lines 2-20 of the Specification as originally filed. As indicated in Fig. 6 and Table 1, the claimed belt is able to operate for its lifetime in an oil environment, while maintaining the necessary mechanical properties and characteristics.

Non-limiting advantages of the claimed belt over known lubricated chain type systems include, among others, reduced elongation over the lifetime of the belt, reduced weight, and reduced width. Further advantages include, *inter alia*, reduced power loss and reduced wear resulting in greater timing precision during the lifetime of the belt, resulting in overall reduced fuel consumption and reduced emissions.

Page 3 of the Office Action asserts that Danhauer discloses a toothed belt for use with oil. Applicants respectfully disagree.

Danhauer discloses a V-ribbed belt with longitudinal reinforcing cords in a load-carrying section (*Danhauer*, Abstract and paragraphs [0001] and [0019]) and is directed to an improved power transmission belt wherein the noise generated during slip conditions is greatly reduced. *Id.*, paragraph [0006].

Initially, Applicants note that the Danhauer reference is silent on the belt comprising teeth. The Danhauer belt has a plurality of longitudinal ribs with a plurality of longitudinal grooves in the compression section. *Id.*, paragraph [0017]. In an embodiment shown in Fig. 2 and described in paragraph [0025], Danhauer discloses a belt with longitudinal ribs and grooves, and transverse grooves. However, Applicants submit, one of ordinary skill in the art would not consider this to be a toothed belt under the broadest reasonable interpretation of the term.

Danhauer is directed to power transmission belts, and specifically directed to v-ribbed belts. *Danhauer*, paragraph [0001]. Applicants respectfully submit that one skilled in the art would recognize v-belts in power transmission systems to be useful in transferring power from a driven pulley or sheave to one or more driven sheaves. In such use, the v-belt tracks in a groove provided in the sheave, and relies on friction between the belt and the sheave to transmit power. Accordingly, one of ordinary skill in the art would not consider the use of a V-belt in an

environment that would reduce the friction between the belt and sheave. Oil is generally regarded as a friction reducing or anti-friction agent. Applicants submit that an oil-wet environment would cause a V-belt to slip, decreasing or eliminating the usefulness of the belt for power transmission. Applicants submit that use of a V-belt in an oil-wet environment would be contrary to the method of operation of a V-belt and would likely prevent the V-belt from functioning as intended to transmit power.

Danhauer recites the invention is directed towards an improved power transmission belt in which the noise generated during slip conditions is greatly reduced. *Danhauer*, paragraph [0006]. Slip is a characteristic of v-belts. The reference fails to disclose or suggest that slip is reduced by the invention, merely that the noise generated during slip conditions is reduced. Therefore, the v-belts of the reference are expected to have slip.

In contrast, a toothed belt is a term of art used to indicate a specific belt type provided with teeth to engage a driving and driven sprockets or gears. The teeth in the toothed belt closely mesh with the sprocket or gear to provide substantially no relative movement between the belt and the sprocket. Because toothed belts specifically engage driving and driven sprockets with no relative movement at the point of engagement, they are known in the art to prevent slip.

Accordingly, because Danhauer specifies a v-ribbed belt and describes a solution to a characteristic problem associated with ribbed belts and not with toothed belts, the reference fails to disclose at least a **toothed belt** as required by the claims.

Moreover, Danhauer is completely silent on the disclosed belt being suitable for use in **substantially continuous contact with oil or partly immersed in oil** as required by the claims. The reference does not discuss use of the belt in an oil environment and, in fact, "oil" is never mentioned in the reference. As discussed amply above, v-belts, as in Danhauer, rely on friction

to transmit power. Use in an environment that may reduce the friction would operate to counter the effectiveness of the v-belt to perform its intended function. Applicant submits that Danhauer does not disclose or suggest a v-belt capable of use in **substantially continuous contact with oil or partly immersed in oil** as required by the claims.

Accordingly, Danhauer fails to disclose at least **a toothed belt adapted for use in substantially continuous contact with oil or partly immersed in oil** as required by the claims. Nothing in Mashimo cures this deficiency.

Mashimo is directed to a drive belt comprising tensile cords having a Lang twist (*Mashimo* column 2, lines 60-61), preferably formed from an aromatic polyamide (*Id.*, column 3, line 19). The characteristics of the belt according to Mashimo are presented in Tables 1-6, and the test procedures followed to obtain the characteristics are outlined in column 5, lines 36. The test conditions do not include any reference to the presence of oil in any form. In the absence of any reference to operation in an oil-wet environment, Mashimo fails to show or provide any reason to use the disclosed belt **in substantially continuous contact with oil or partly immersed in oil** as required by the claims.

The Office Action concedes on page 4 that Danhauer fails to disclose teeth being coated by a first fabric. Instead, the Office Action relies on Mashimo to teach a plurality of teeth **coated by a first fabric**. As explained above, Danhauer does not disclose a toothed belt, and therefore fails to disclose a belt with teeth at all. Assuming, arguendo, that Danhauer can be found to disclose a toothed belt, which Applicants urge is not the case, covering any part of the belt disclosed in Danhauer with fabric does not cure the deficiencies discussed above. Accordingly, the combination of references fails to disclose **a toothed belt adapted for use in substantially continuous contact with oil or partly immersed in oil** as required by the claims.

Claim 51 recites, inter alia, **said first material is glass fiber and said second material is carbon fiber**. Applicants respectfully submit that the combination of glass fibers and carbon fibers as suitable materials in an oil-wet condition is not disclosed or rendered predictable in any of the cited references.

Accordingly, Applicants respectfully submit that Danhauer and Mashimo, either alone or in combination, fail to disclose at least **a toothed belt adapted for use in substantially continuous contact with oil or partly immersed in oil** as required by the claims.

Reconsideration and withdrawal of the rejections based on Danhauer and Mashimo is respectfully requested.

Claim 25 is rejected under § 103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2004/0033857 to Welk et al. ("Welk") in view of Mashimo.

In rejecting claim 25, the Office Action asserts, on page 10, that Welk discloses, *inter alia*, a toothed belt for use in oil. The Office Action concedes that Welk fails to disclose teeth being coated in fabric and relies on Mashimo for such a disclosure. Applicants respectfully disagree for at least the following reasons.

Applicants submit Welk describes a low modulus belt having a hybrid composition comprising a polyamide strand core and an outer strand of polyester. A low modulus belt such as Welk is adapted to be used where the torque to be transmitted is less than that required for a high load application. *Welk*, paragraph [0006].

Initially, Applicants note that the Welk reference is silent on the belt being a toothed belt. As discussed above regarding Danhauer, a toothed belt is a specific type of belt in the art with specific characteristics. Absent a specific reference to the characteristics of a toothed belt, one of ordinary skill in the art would not recognize Welk to be a toothed belt.

The Office Action points to element 12 as corresponding to teeth. However, the inventive belt of Welk comprises ribs (reference element 12) extending in an endless direction (*Welk*, paragraph [0022]), shown in the cross section depicted in Fig. 1 to be in the longitudinal direction. Because the ribs are disclosed to extend in an endless direction, the reference does not suggest that the ribs could be interrupted, as would be required for a toothed belt. Accordingly, there is no suggestion that the belt in Welk could be modified to provide a toothed belt as claimed.

Furthermore, Welk is completely silent on the disclosed belt being suitable for use in **substantially continuous contact with oil or partly immersed in oil** as required by the claims. The reference does not discuss use of the belt in an oil environment; in fact, “oil” is never mentioned in the application. Therefore, contrary to the assertion in the Office Action, Welk does not disclose a belt for use with oil.

Accordingly, Welk fails to disclose at least **a toothed belt adapted for use in substantially continuous contact with oil or partly immersed in oil** as required by the claims. Nothing in Mashimo cures this deficiency.

As discussed above, even if the disclosure in Mashimo is as asserted in the Office Action, the modification of Welk by Mashimo fails to disclose **a toothed belt adapted for use in substantially continuous contact with oil or partly immersed in oil** as required by the claims. Assuming, *arguendo*, that Mashimo discloses teeth covered in fabric, as amply discussed above, Welk fails to disclose teeth. Furthermore, neither reference suggests such a belt would be suitable for use in **substantially continuous contact with oil or partly immersed in oil** as required by the claims.

Applicants submit that a feature of the claimed belt is superior performance in an oil-wet environment as demonstrated by test data included in Fig. 6 of the Application as originally filed. Known toothed belts are used in a dry condition, i.e., not in **substantially continuous contact with oil or partly immersed in oil** as required by the claims. Although applications of known belts cannot exclude belt contact with an oil mist or oil droplets from the environment, the belts are known to have a very low resistance to oil would experience a dramatic reduction in tensile strength over the expected life of the engine, and in this sense would fail if used in an oil-wet environment as illustrated in Fig. 6. Figure 6 clearly shows that the belt including the claimed hybrid inserts of a first and second material show marked improvement over prior art belts.

Industry standard oil resistance tests for toothed belts provide a significantly different test protocol than that used in the example of the present invention. For example, ISO 12046, "Synchronous belt drives -- Automotive belts -- Determination of physical properties," cites the only test for oil resistance to be a static exposure test for 70 hours, followed by measuring the hardness of the rubber core and tooth shear testing. Such a test is inadequate and irrelevant to operating a belt in an oil-wet environment, as it is designed to test oil resistance in a dry environment.

In contrast, the claimed belt was tested in the oil-wet environment described on page 14, lines 5-9 and in Table 1 of the Specification to simulate the actual use of a toothed belt in an oil-wet environment. The resistant inserts of the claimed belt tested comprised fibers produced from at least a first and a second material. The known belt was of the same construction, but made entirely of one material, namely glass fibers. The test was conducted for 80,000,000 cycles in constant contact with oil. Under the described test conditions, the claimed belt exhibited superior tensile strength throughout the life of the belt.

Applicants note the test described therein was designed for the purpose of testing the claimed belt, as no such known industry testing method existed prior to the time of testing. That is to say, there was no test for testing the lifetime operation of belts in the oil wet environment as described in the specification. As explained above, this is because belts for dry conditions were never designed for use in oil-wet environments, nor was such use contemplated.

Nothing in the cited references suggests a belt suitable for use in an oil-wet environment. Moreover, nothing in the references disclose or render predictable the superior test results obtained from a resistant insert comprised of fibers produced from at least a first and a second material when used in substantially continuous contact or partially submersed in oil.

For at least the foregoing reasons, it is believed that revised independent claims 1, 25 and 51 patentably distinguish over the relied upon portions of Danhauer, Mashimo, and Welk either alone or in combination, and is therefore allowable. Further, claims 2-24, which depend from claim 1, claims 26-50, which depend from claim 25, and claims 51-66 which depend from claim 51, are allowable as well.

Statements appearing above with respect to the disclosures in the cited references represent the present opinions of the Applicants' undersigned attorney and, in the event that the Examiner disagrees with any such opinions, it is respectfully requested that the Examiner specifically indicate those portions of the respective reference providing the basis for a contrary view.

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CONCLUSION

In view of the foregoing, it is believed that the present application is in condition for allowance. Accordingly, Applicants' attorneys respectfully request that a timely Notice of Allowance be issued in this case.

Please charge any fees incurred by reason of this response and not paid herewith to Deposit Account No. 50-0320.

Respectfully submitted,
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